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Cloutier

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(54) **SYSTEMS AND METHODS FOR ALIGNMENT TECHNIQUES FOR MAGNETIC CARDS AND DEVICES**

(75) Inventor: **Bruce S. Cloutier**, Jeannette, PA (US)

(73) Assignee: **DYNAMICS INC.**, Pittsburgh, PA (US)

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See application file for complete search history.

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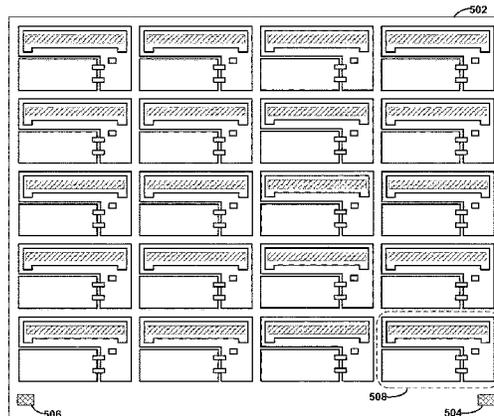
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(57) **ABSTRACT**

Cards may be populated with components and alignment cues. A fully populated card may then be laminated using either of a clear (e.g., transparent) laminate or an obscure (e.g., opaque) laminate. Visual and/or non-visual alignment cues within a card may be utilized to align a trimming and/or singulation device to the card. The card may be singulated and/or trimmed with the aligned singulation and/or trimming device to position one or more components of the card.

19 Claims, 6 Drawing Sheets



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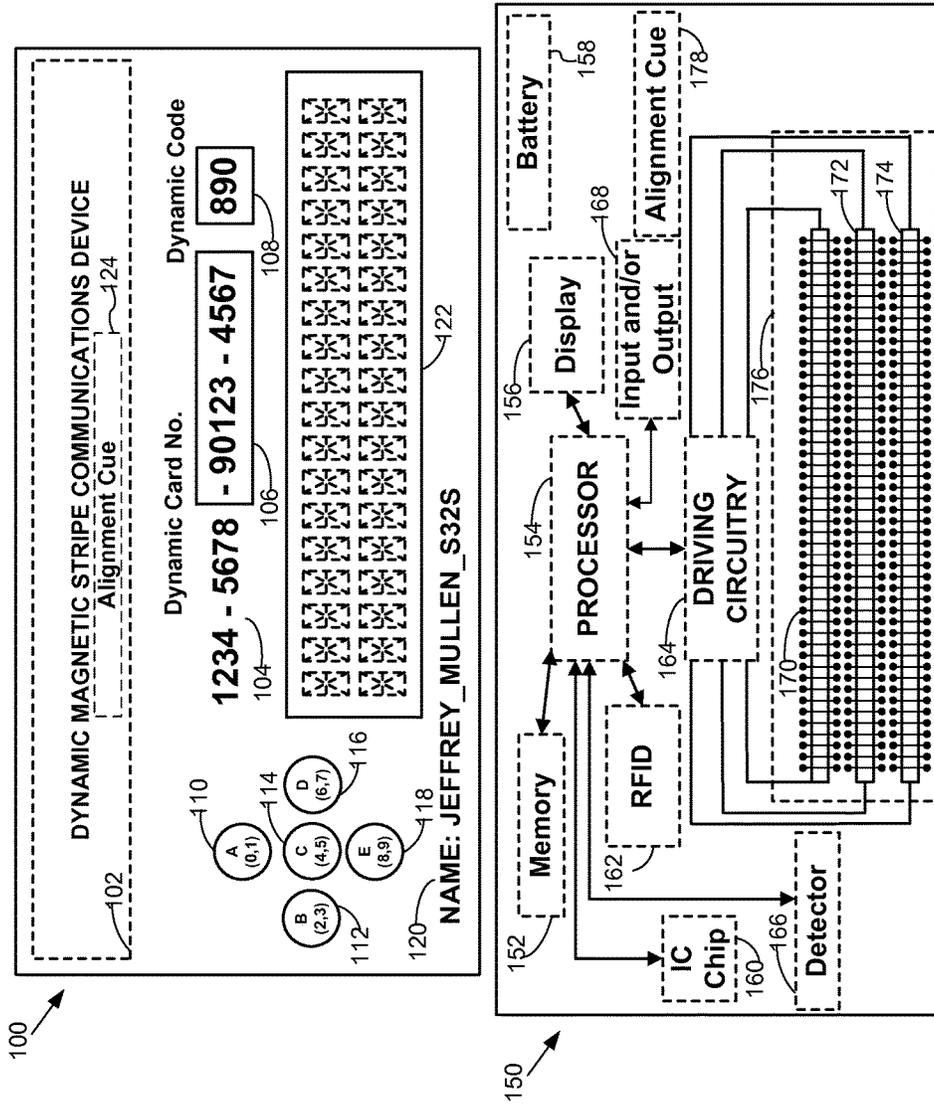
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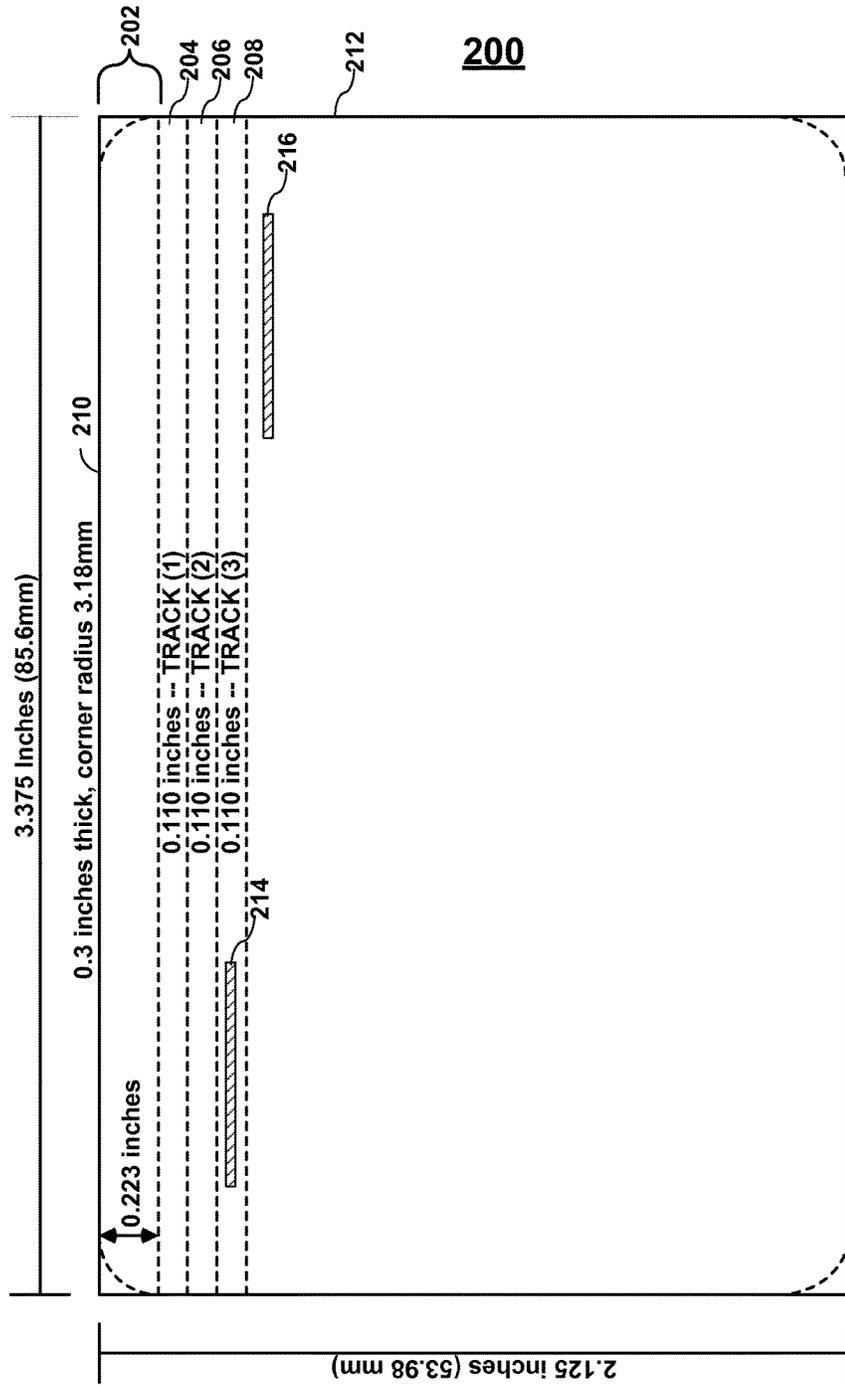


FIG. 2

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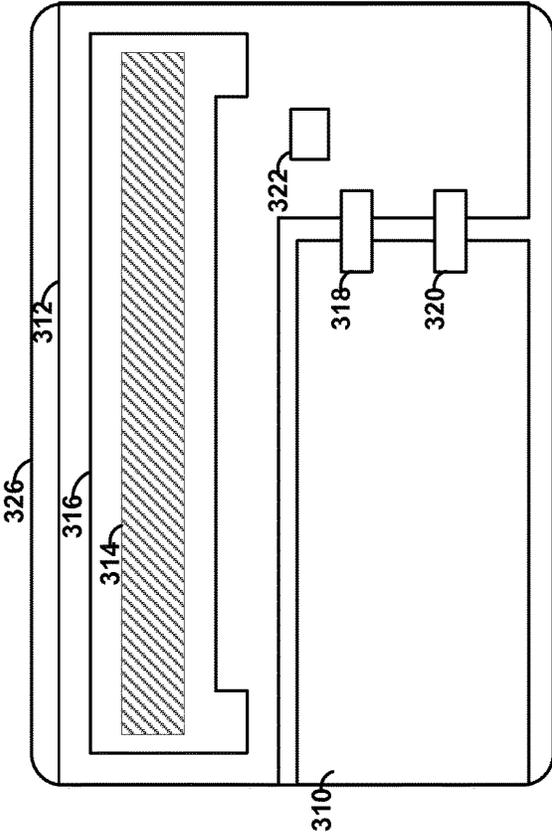


FIG. 3

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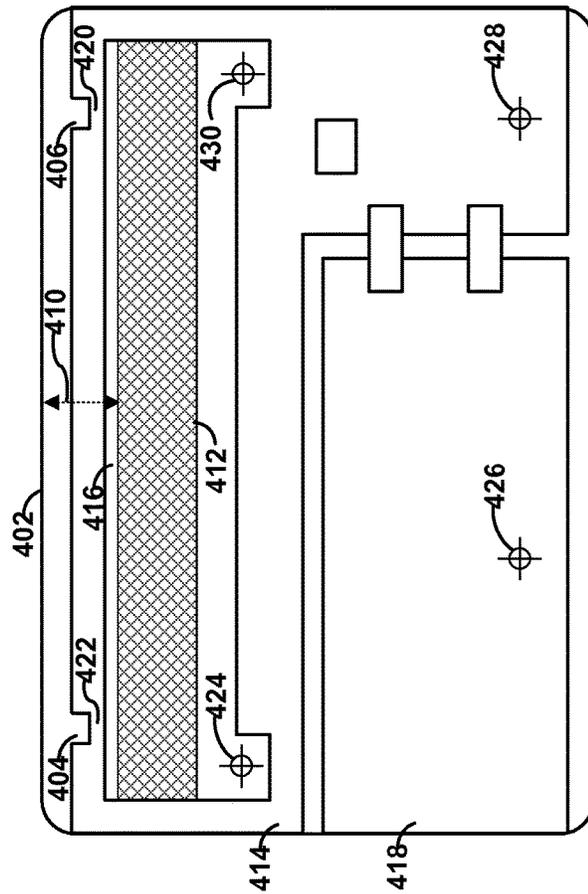


FIG. 4

500

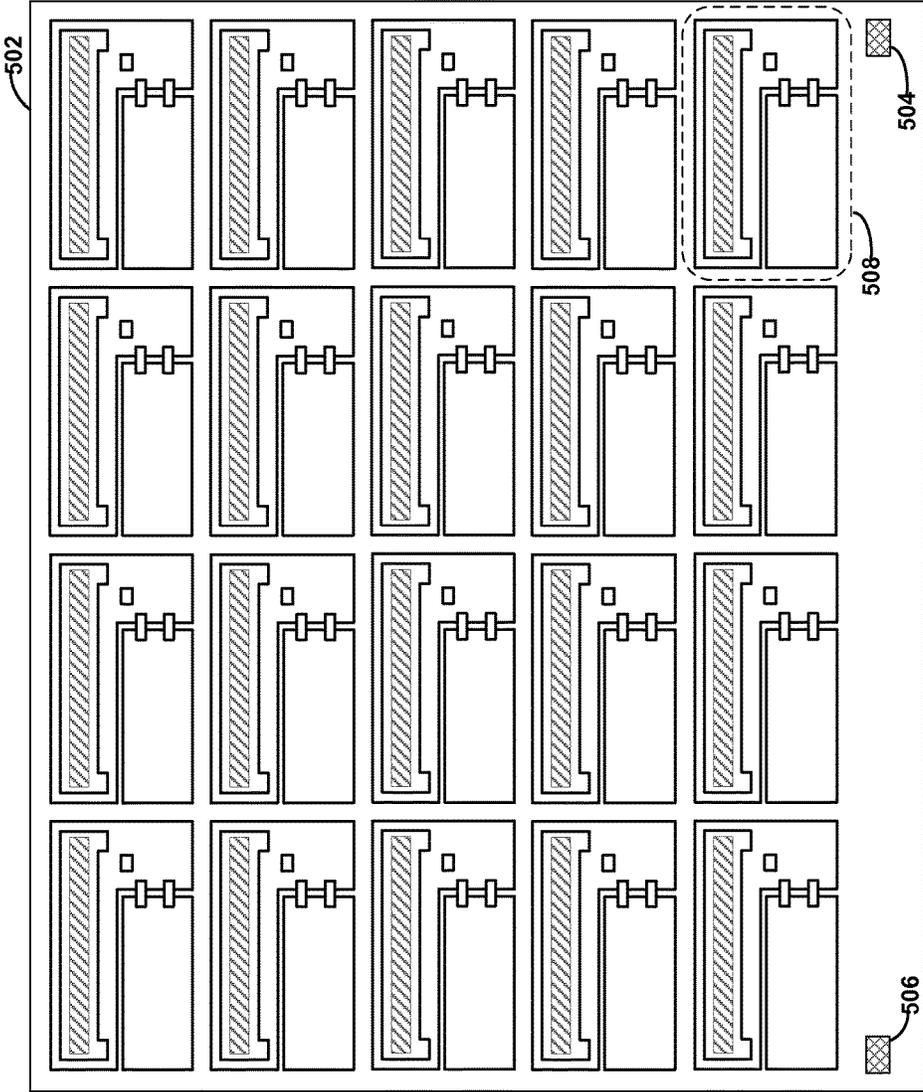


FIG. 5

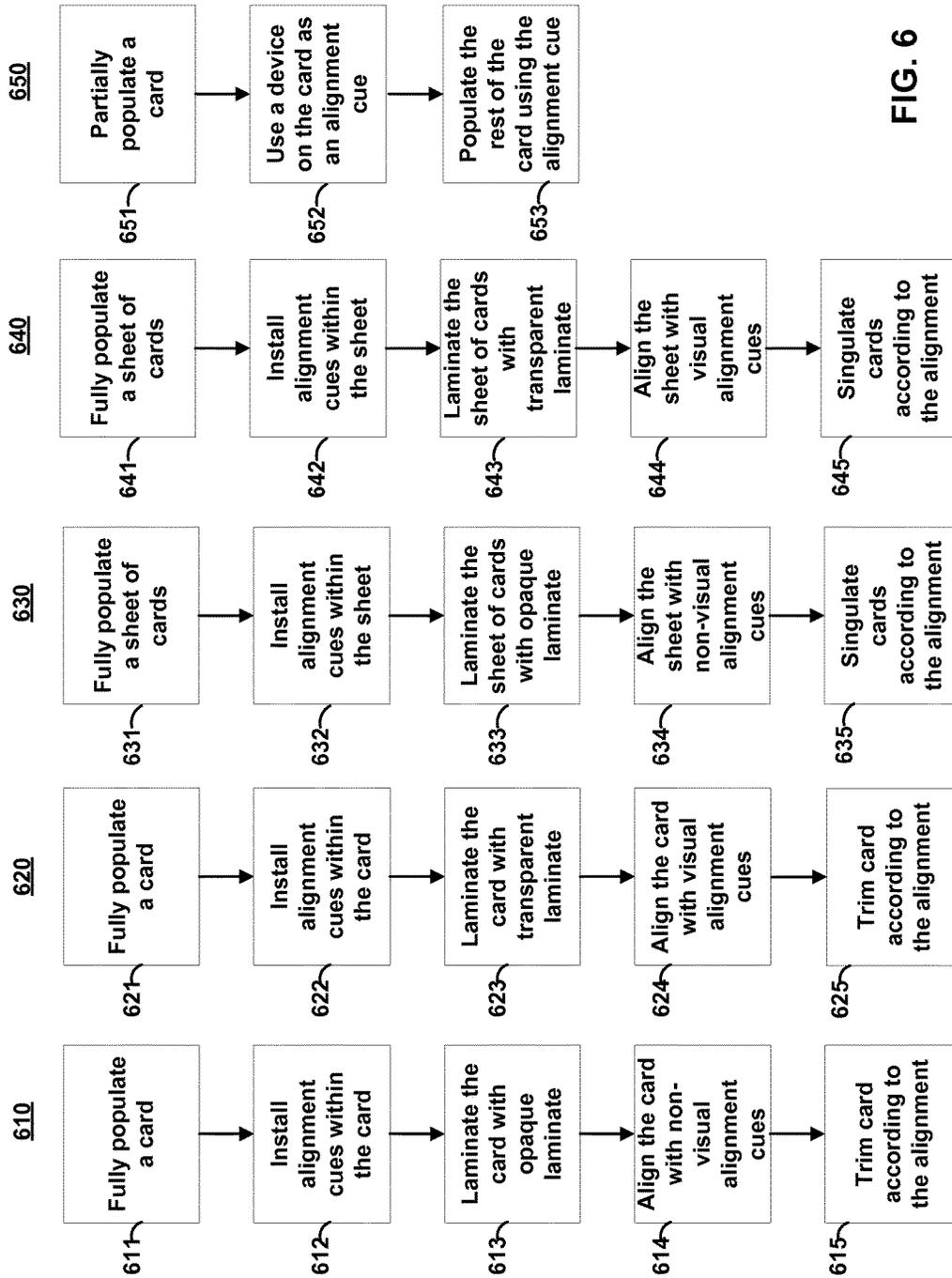


FIG. 6

SYSTEMS AND METHODS FOR ALIGNMENT TECHNIQUES FOR MAGNETIC CARDS AND DEVICES

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefit of U.S. Provisional Patent Application No. 61/393,511, titled "SYSTEMS AND METHODS FOR ALIGNMENT TECHNIQUES FOR MAGNETIC CARDS AND DEVICES," filed Oct. 15, 2010, which is hereby incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

This invention relates to magnetic cards and devices and related systems.

SUMMARY OF THE INVENTION

A card may include a dynamic magnetic communications device, which may take the form of a magnetic encoder or a magnetic emulator. A magnetic encoder, for example, may be utilized to modify information that is located on a magnetic medium, such that a magnetic stripe reader may then be utilized to read the modified magnetic information from the magnetic medium. A magnetic emulator, for example, may be provided to generate electromagnetic fields that directly communicate data to a read-head of a magnetic stripe reader. A magnetic emulator, for example, may communicate data serially to a read-head of the magnetic stripe reader. A magnetic emulator, for example, may communicate data in parallel to a read-head of the magnetic stripe reader.

All, or substantially all, of the front surface, as well as the rear surface, of a card may be implemented as a display (e.g., bi-stable, non bi-stable, LCD, or electrochromic display). Electrodes of a display may be coupled to one or more touch sensors, such that a display may be sensitive to touch (e.g., using a finger or a pointing device) and may be further sensitive to a location of the touch. The display may be sensitive, for example, to objects that come within a proximity of the display without actually touching the display.

Input and/or output devices may be included on a card, for example, to facilitate data exchange with the card. For example, an integrated circuit (IC) may be included on a card and exposed from the surface of the card. Such a chip (e.g., an EMV chip) may communicate information to a chip reader (e.g., an EMV chip reader). An RFID antenna or module may be included on a card, for example, to send and/or receive information between an RFID reader and the RFID included on the card.

A card may include multiple buttons and each button may be associated with a different product or feature. Alternatively, for example, a card may include a single button, but that single button may be used to, for example, toggle between multiple products. For example, pressing a button on a card a first time may cause a first payment product to be communicated via a dynamic magnetic stripe communications device. Pressing that button on that card a second time may, however, cause a second payment product to be communicated via that dynamic magnetic stripe communications device. Accordingly, a user may utilize a single button to toggle between multiple payment products. Such payment products may include a debit product, credit product, gift product, pre-paid product, or any other type of

product. For example, a card may include two credit accounts, where each credit account may be associated with a different association (e.g., Discover, MasterCard, Visa, American Express) or each credit account may be associated with the same association.

A card may be assembled as a combination of two or more circuit boards. A dynamic magnetic stripe communications device, for example, may be fabricated and assembled on a first circuit board while a second circuit board may be fabricated and assembled having other circuitry. For example, a card's processor, dynamic magnetic communications device driver circuitry, user interfaces, read-head detectors, light emitting devices, displays, batteries, and any other type of sensor, device, or associated circuitry may be fabricated on one or more other circuit boards.

A dynamic magnetic communications device may be fabricated on a flexible circuit board, for example, by providing a multiple layer flexible board (e.g., a two layer flexible printed circuit board). A coil for each track of information may be provided by including wire segments on each layer and interconnecting these wire segments through layer interconnections to create a coil. For example, a dynamic magnetic communications device may include two coils such that two tracks of information may be communicated to two different read-heads included in a read-head housing of a magnetic stripe reader. A dynamic magnetic communications device may include three coils such that three tracks of information may be communicated serially to three different read-heads included in a read-head housing of a magnetic stripe reader.

In manufacturing multiple boards dedicated to particular functions, functionality and reliability of each board may be verified separately before assembling. Once verified, one or more of the circuit boards may be mechanically and/or electrically coupled together via, for example, epoxy or conductive tape to form, for example, an electronics package. Such an electronics package may also include a dynamic magnetic communications device.

The electronics package may then be laminated to form a final card assembly. Such a lamination may occur, for example, in an injection molding process (e.g., a reaction injection molding process). A laminate may be, for example, a silicon-based material or a polyurethane-based material. The laminated card may then be provided to a personalization facility for personalization. During personalization, for example, a customer's personal data may be placed on the exterior of the card (e.g., printed, embossed, or laser etched) as well as programmed into a processor's memory of the card.

The process that may be used to laminate a card assembly (e.g., an injection molding process) may yield a final card assembly having non-conforming dimensions. Accordingly, a laminated card assembly may require a trimming process, such that geometric dimensions of the trimmed card assembly may meet predetermined physical characteristics.

Alignment cues may be integrated within the card assembly to align such a trimming process. Accordingly, trimming equipment may be aligned to such alignment cues to precisely define the physical dimensions of the trimmed card.

Alignment cues may be utilized to align one or more components of the card assembly (e.g., the one or more tracks of a dynamic magnetic communications device). In so doing, the one or more tracks of a dynamic magnetic communications device may be precisely aligned with one or more dimensions of the card assembly. Once all compo-

nents of the final card assembly are aligned, placed, and laminated, alignment cues may be used to trim the final card assembly.

Automated processes may be utilized to manufacture card assemblies in large quantities. For example, a pick-and-place machine may be utilized to place one or more electronics packages onto a sheet of material such that once placed, a single sheet may contain multiple (e.g., 16) card assemblies. A dynamic magnetic communications device may be one of the electronics packages that may be placed onto each card assembly by a pick-and-place machine. One or more alignment cues may be utilized by the pick-and-place machine to obtain precise alignment of each electronics package.

A second sheet may be laminated over the sheet of card assemblies to form a continuous sheet of card assemblies, such that both sides of the sheet of card assemblies may be laminated. The continuous sheet of card assemblies may be singulated into individual cards via an automated singulation process. Alignment cues, for example, may be implemented within one or more of the card assemblies to align a singulation machine that may be operating during the automated singulation process. Accordingly, each individual card may be singulated from the sheet of card assemblies and may possess correct physical dimensions.

At least one alignment cue, for example, may be implemented within a sheet of card assemblies. In so doing, an automated singulation machine may train onto the single alignment cue to obtain one or more alignment coordinates that may be necessary to accurately singulate one or more of the card assemblies from the sheet of card assemblies.

An alignment cue, for example, may be implemented as a visual alignment cue, whereby optical indicia, such as notches and tick marks, may be implemented to aid alignment. An alignment cue, for example, may be implemented as a non-visual cue, whereby other indicia, such as electronic and/or magnetic signals, may be implemented to aid alignment.

Such non-visual cues may be required, for example, during singulation and/or trimming of one or more card assemblies that may be laminated with non-transparent laminate material (e.g., opaque laminate material). In so doing, singulation and/or trimming equipment may train onto the non-visual cues to effect accurate singulation and/or trimming processes without the need to optically train onto a visual cue.

Non-visual cues, for example, may be implemented during one or more assembly stages of a card assembly. For example, a magnetic material may be placed within a card assembly at any stage of the assembly process, such that the magnetic material may provide a magnetic alignment cue that may be detected and used to align, locate and/or place components for any remaining assembly processes. In addition, a magnetic alignment cue may be detected and used to align any trimming and/or singulation processes that may be performed after the assembly process is complete.

Electronic cues (e.g., RFID tags) may also be used as alignment cues. For example, an RFID tag may communicate positions of individual electronics packages on a particular card assembly. RFID tags, for example, may communicate alignment cues that may be indicative of positions of one or more card assemblies that may exist on a sheet of card assemblies. Accordingly, pick-and-place machines and/or singulation machines may receive the alignment cues communicated by such RFID tags and may perform their respective procedures in accordance with alignment coordinates received from the RFID tags.

BRIEF DESCRIPTION OF THE DRAWINGS

The principles and advantages of the present invention can be more clearly understood from the following detailed description considered in conjunction with the following drawings, in which the same reference numerals denote the same structural elements throughout, and in which:

FIG. 1 is an illustration of a card constructed in accordance with the principles of the present invention;

FIG. 2 is an illustration of a card constructed in accordance with the principles of the present invention;

FIG. 3 is an illustration of a card constructed in accordance with the principles of the present invention;

FIG. 4 is an illustration of a card constructed in accordance with the principles of the present invention;

FIG. 5 is an illustration of multiple cards constructed in accordance with the principles of the present invention; and

FIG. 6 is an illustration of process flow charts constructed in accordance with the principles of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 shows card **100** that may include, for example, a dynamic number that may be entirely, or partially, displayed using a display (e.g., display **106**). A dynamic number may include a permanent portion such as, for example, permanent portion **104** and a dynamic portion such as, for example, dynamic portion **106**. Card **100** may include a dynamic number having permanent portion **104** and permanent portion **104** may be incorporated on card **100** so as to be visible to an observer of card **100**. For example, labeling techniques, such as printing, embossing, laser etching, etc., may be utilized to visibly implement permanent portion **104**.

Card **100** may include a second dynamic number that may also be entirely, or partially, displayed via a second display (e.g., display **108**). Display **108** may be utilized, for example, to display a dynamic code such as a dynamic security code. Card **100** may also include third display **122** that may be used to display graphical information, such as logos and barcodes. Third display **122** may also be utilized to display multiple rows and/or columns of textual and/or graphical information.

Persons skilled in the art will appreciate that any one or more of displays **106**, **108**, and/or **122** may be implemented as a bi-stable display. For example, information provided on displays **106**, **108**, and/or **122** may be stable in at least two different states (e.g., a powered-on state and a powered-off state). Any one or more of displays **106**, **108**, and/or **122** may be implemented as a non-bi-stable display. For example, the display is stable in response to operational power that is applied to the non-bi-stable display. Other display types, such as LCD or electrochromic, may be provided as well.

Other permanent information, such as permanent information **120**, may be included within card **100**, which may include user specific information, such as the cardholder's name or username. Permanent information **120** may, for example, include information that is specific to card **100** (e.g., a card issue date and/or a card expiration date). Information **120** may represent, for example, information that includes information that is both specific to the cardholder, as well as information that is specific to card **100**.

Card **100** may accept user input data via any one or more data input devices, such as buttons **110-118**. Buttons **110-118** may be included to accept data entry through mechanical distortion, contact, or proximity. Buttons **110-118** may be responsive to, for example, induced changes and/or devia-

tions in light intensity, pressure magnitude, or electric and/or magnetic field strength. Such information exchange may then be determined and processed by a processor of card 100 as data input.

Dynamic magnetic stripe communications device 102 may, for example, provide one, two and/or three tracks of magnetic stripe data upon receiving data input from one or more buttons 110-118 (e.g., magnetic stripe data may be communicated after detection of a housing of a magnetic stripe reader and after receiving data input from a button). Dynamic magnetic stripe communications device 102 may, for example, include alignment cue 124 that may provide alignment information for placement of one or more components of card 100. Alignment cue 124 may, for example, provide magnetic information for placement of one or more components of card 100.

FIG. 1 shows architecture 150, which may include one or more processors 154. One or more processors 154 may be configured to utilize external memory 152, internal memory of processor 154, or a combination of external memory 152 and internal memory for dynamically storing information, such as executable machine language, related dynamic machine data, and user input data values.

One or more of the components shown in architecture 150 may be configured to transmit information to processor 154 and/or may be configured to receive information as transmitted by processor 154. For example, one or more displays 156 may be coupled to receive data from processor 154. The data received from processor 154 may include, for example, at least a portion of dynamic numbers and/or dynamic codes.

One or more displays 156 may be, for example, touch sensitive and/or proximity sensitive. For example, objects such as fingers, pointing devices, etc., may be brought into contact with displays 156 and/or in proximity to displays 156. Detection of object proximity or object contact with displays 156 may be effective to perform any type of function (e.g., transmit data to processor 154). Displays 156 may have multiple locations that are able to be determined as being touched, or determined as being in proximity to an object.

Input and/or output devices may be implemented on architecture 150. For example, integrated circuit (IC) chip 160 (e.g., an EMV chip) may be included within architecture 150, that can communicate information with a chip reader (e.g., an EMV chip reader). Radio frequency identification (RFID) module 162 may be included within architecture 150 to enable the exchange of information with an RFID reader.

Other input and/or output devices 168 may be included within architecture 150, for example, to provide any number of input and/or output capabilities. For example, other input and/or output devices 168 may include an audio device capable of receiving and/or transmitting audible information.

Other input and/or output devices 168 may include a device that exchanges analog and/or digital data using a visible data carrier. Other input and/or output devices 168 may include a device, for example, that is sensitive to a non-visible data carrier, such as an infrared data carrier or electromagnetic data carrier.

Persons skilled in the art will appreciate that a card (e.g., card 100 of FIG. 1) may, for example, be a self-contained device that derives its own operational power from one or more batteries 158. Furthermore, one or more batteries 158 may be included, for example, to provide operational power for a period of time (e.g., approximately 2-4 years). One or more batteries 158 may be included, for example, as rechargeable batteries.

Electromagnetic field generators 170-174 may be included within architecture 150 to communicate information to, for example, a read-head of a magnetic stripe reader via, for example, electromagnetic signals. For example, electromagnetic field generators 170-174 may be included to communicate one or more tracks of electromagnetic data to read-heads of a magnetic stripe reader. Electromagnetic field generators 170-174 may include, for example, a series of electromagnetic elements, where each electromagnetic element may be implemented as a coil wrapped around one or more materials (e.g., a magnetic material and/or a non-magnetic material). Additional materials may be placed outside the coil (e.g., a magnetic material and/or a non-magnetic material).

Electrical excitation by processor 154 of one or more coils of one or more electromagnetic elements via, for example, driving circuitry 164 may be effective to generate electromagnetic fields from one or more electromagnetic elements. One or more electromagnetic field generators 170-174 may be utilized to communicate electromagnetic information to, for example, one or more read-heads of a magnetic stripe reader.

Materials may be placed inside and/or outside of the coils of magnetic field generators 170, 172, and/or 174, for example, and such materials may provide alignment cue 178. Accordingly, automated machinery such as a pick-and-place machine, a trimming machine, and/or a singulation machine may detect alignment cue 178 to determine a substantially precise placement of the components of a card (e.g., dynamic magnetic stripe communications device 102 of card 100 of FIG. 1). In addition, relative positions of other components of a card and/or the relative position of one or more sides of a card may be determined from alignment cue 178.

RFID module 162 may communicate alignment information. For example, RFID module 162 may communicate a position of one or more components of a card (e.g., card 100 of FIG. 1) to a machine that may be used during the assembly of the card. Accordingly, a subsequent trimming and/or singulation process may establish, for example, a position of electromagnetic field generators 170-174 relative to one or more sides of a card after a trimming and/or singulation process completes. For example, electromagnetic field generators 170-174 may be substantially aligned at a particular distance from the long and/or short sides of a card (e.g., card 100 of FIG. 1) after trimming and/or singulation is completed.

Other alignment cues 178 may be implemented within architecture 150. For example, notches, tick marks, and/or alignment targets, may be implemented. Accordingly, manual or automated machinery may be trained onto alignment cue 178 to allow precise placement and/or alignment of one or more components of a card.

Timing aspects of information exchange between architecture 150 and the various I/O devices implemented on architecture 150 may be determined by processor 154. One or more detectors 166 may be utilized, for example, to sense the proximity, mechanical distortion, or actual contact, of an external device, which in turn, may trigger the initiation of a communication sequence. The sensed presence or touch of the external device may then be communicated to a controller (e.g., processor 154), which in turn may direct the exchange of information between architecture 150 and the external device. The sensed presence, mechanical distortion, or touch of the external device may be effective to, for example, determine the type of device or object detected.

For example, the detection may include the detection of, for example, a read-head housing of a magnetic stripe reader. In response, processor **154** may activate one or more electromagnetic field generators **170-174** to initiate a communications sequence with, for example, one or more read-heads of a magnetic stripe reader. The timing relationships associated with communications to one or more electromagnetic field generators **170-174** and one or more read-heads of a magnetic stripe reader may be provided through use of the detection of the magnetic stripe reader.

Persons skilled in the art will appreciate that processor **154** may provide user-specific and/or card-specific information through utilization of any one or more of buttons **110-118**, RFID **162**, IC chip **160**, electromagnetic field generators **170-174**, and other input and/or output devices **168**.

FIG. 2 shows card **200**. A distance between an edge of card **200** (e.g., edge **210**) and track **1** of a magnetic stripe is substantially equal to dimension **202**, which may be approximately between 0.220 and 0.225 inches (e.g., 0.223 inches). In addition, a track height may be measured along edge **212**, which may be approximately between 0.109 and 0.111 inches (e.g., 0.110 inches).

Tracks **1**, **2**, and/or **3** may be the track locations of one or more magnetic encoders. Accordingly, a magnetic medium may be placed onto card **200** substantially in locations **204**, **206**, and/or **208**, such that one or more magnetic encoders may change magnetic information stored within tracks **1**, **2**, and/or **3** of such a magnetic medium. Such changed information may then be read by a magnetic stripe reader.

Tracks **1**, **2**, and/or **3** may be the track locations of one or more magnetic emulators. Accordingly, a magnetic medium may not be placed onto card **200**. Rather, one or more coils of such magnetic emulators may be placed substantially at locations **204**, **206**, and/or **208**. In so doing, such magnetic emulators may generate electromagnetic fields that may communicate data to a read-head of a magnetic stripe reader.

One or more materials **214** may, for example, be placed within one or more track locations **204-208**. One or more materials **216** may, for example, be placed outside one or more track locations **204-208**. Materials **214** and **216** may, for example, provide alignment cues to establish a distance (e.g., distance **202**) that may define a location of one or more tracks **204-208** relative to a side of card **200** (e.g., side **210**). Materials **214** and **216** may, for example, be magnetic or non-magnetic materials.

FIG. 3 shows card **300** that may include, for example, board **312**, board **316**, permanent magnet **314**, RFID **322**, board **310**, and conductive leads **318** and **320**. Board **316** may include, for example, two or three coils. Each coil may have material inside the coil (e.g., a magnetic or non-magnetic material). Permanent magnet **314** may be placed across all such coils. Alternately, multiple magnets may be provided, for example, where each magnet may be positioned over a coil.

Additional circuitry may be provided on board **310** and/or board **312**. For example, a processor, a battery, a display, a display driver, driver circuitry for a dynamic magnetic stripe communications device, light emitting diodes, light sensors, infrared sensors and transmitters, capacitive sensing contacts, and any type of button may be provided.

All boards, circuitry, and other components of card **300** may be laminated to form card assembly **326**. Card assembly **326** may, for example, require trimming. For example, card assembly **326** may be trimmed such that a dynamic magnetic

stripe communications device that may be located on board **312** may exhibit a proper separation distance from an edge of card assembly **326**.

Card assembly **326** may, for example, exhibit a non-transparent laminate structure, which may obscure an optical verification of a position of a dynamic magnetic stripe communications device that may be located on card assembly **326**. A magnetic field that may be produced, for example, by hard magnet **314** may nevertheless be sensed by a trimming device. Accordingly, card assembly **326** may first be properly aligned to such a magnetic field and then trimmed in accordance with such an alignment to maintain a separation distance between an edge of card assembly **326** and a dynamic magnetic stripe communications device that may be located on card assembly **326**.

RFID **322** may provide location information that may define, for example, coordinates of all components, boards, and other devices on card assembly **326**. Such information may be received by a trimming device to determine relative positioning and alignment of card assembly **326** prior to trimming. Accordingly, post-trim dimensions of card assembly **326** and the relative positioning of components (e.g., a dynamic magnetic stripe communications device) on card assembly **326** may be held within tolerances.

FIG. 4 shows card **400**. Card **400** may include one or more boards (e.g., boards **414**, **416**, and **418**). Boards **414**, **416**, and/or **418**, may contain, for example, a processor, a battery, a display, a button, and any other component that may be provided on a card. Card **400** may include dynamic magnetic stripe communications device **412**. Positioning of dynamic magnetic stripe communications device **412** may be determined, such that dimension **410**, for example, may be held to within tolerance.

Alignment cues (e.g., notches **404** and **406**) may be provided to aid in the alignment of, for example, dynamic magnetic stripe communications device **412**. For example, gaps **420** and **422** may be used to optically align board **416** onto board **414**, for example, such that dynamic magnetic stripe communications device **412** exhibits a correct placement with respect to board **414**.

The location of other components of card **400** may also be aligned with alignment cues **404** and/or **406**. Automated alignment using, for example, a pick-and-place machine may be utilized to place one or more components onto boards **414**, **416**, and/or **418**. In so doing, such a pick-and-place machine may align itself to alignment cues **404** and **406**, where placement of the components of card **400** may be referenced to alignment cues **404** and **406** for precise placement.

Persons skilled in the art will appreciate that alignment cues **404** and **406** may provide both visual alignment cues as well as mechanical alignment cues. For example, automated machinery that may be involved with the assembly of card **400** may include protrusions that engage notches **404** and **406** to mechanically align the automated machine to card **400**. Once aligned, the automated machine may place components onto card **400** using the alignment as a placement reference.

Card **400** may be laminated to form card assembly **402**, such that the laminate may cover dynamic magnetic stripe communications device **412**. Such a laminate may, for example, be transparent or translucent. Accordingly, an orientation of dynamic magnetic stripe communications device **412** with respect to, for example, dimension **410** may nevertheless be implemented through alignment of a trimming and/or a singulation device to cues **404** and/or **406**, since cues **404** and/or **406** may remain visible despite being

covered by the laminate. In so doing, the trimming and/or singulation device may optically train onto cues **404** and/or **406** so as to maintain dimension **410** within tolerance after a trimming and/or singulation process on card assembly **402** is complete.

Persons skilled in the art will appreciate that other visual cues may be implemented to aid in alignment. For example, one or more datums **424-430** may be placed onto one or more boards **414-418** to act as visual alignment cues during assembly. One or more datums **424-430**, for example, may be printed (e.g., using a silkscreen) onto boards **414-418**.

FIG. **5** shows a sheet of cards **500**. Sheet assembly **502** may consist of a plurality of fully populated cards **508** that may have been placed by automated processes. For example, a pick-and-place machine may be utilized to place (e.g., simultaneously place) a plurality of electronics packages **508** onto a sheet of material. A second sheet of material may be laminated over populated cards **508** to form sheet assembly **502**.

One or more alignment cues **504** and/or **506** may be implemented within sheet assembly **502** to obtain, for example, precise alignment of each electronics package **508** with respect to sheet assembly **502**. For example, an automated singulation machine may train onto alignment cues **504** and/or **506** to obtain one or more alignment coordinates that may be necessary to accurately singulate each card assembly **508** from sheet assembly **502**. In so doing, dimensions of each card assembly **508** singulated from sheet assembly **502** may conform to predetermined card dimensions.

Multiple process flow charts are shown in FIG. **6**. Step **611** of sequence **610** may include fully populating a card with components, such as processors, batteries, buttons, and dynamic magnetic stripe communication devices. Alignment cues may be installed within the card (e.g., as in step **612**) and the fully assembled card may then be laminated with an obscure (e.g., opaque) laminate (e.g., as in step **613**). The non-visual alignment cues (e.g., electronic and/or magnetic alignment cues) may be used to align the card (e.g., as in step **614**) so that the card may be precisely trimmed (e.g., as in step **615**).

Steps **621** and **622** of sequence **620** may include fully populating a card with components and installing alignment cues within the card. The fully assembled card may then be laminated with a clear (e.g., transparent) laminate (e.g., as in step **623**). The visual alignment cues (e.g., notches and/or indicia) may be used to align the card (e.g., as in step **624**) so that the card may be precisely trimmed (e.g., as in step **625**).

A sheet of populated cards may be placed (e.g., simultaneously placed) to form a sheet assembly of cards (e.g., as in step **631**). Alignment cues may be installed within the sheet assembly (e.g., as in step **632**) and laminated with an obscure (e.g., opaque) laminate (e.g., as in step **633**). The sheet assembly may be aligned with a singulation device in accordance with non-visual alignment cues (e.g., as in step **634**) and then singulated to precise dimensions (e.g., as in step **635**).

A plurality of populated cards may be placed to form a sheet assembly of cards (e.g., as in step **641** of sequence **640**). Alignment cues may be installed within the sheet assembly (e.g., as in step **642**) and laminated with a clear (e.g., transparent) laminate (e.g., as in step **643**). The sheet assembly may be aligned with a singulation device in accordance with visual alignment cues (e.g., as in step **644**) and then singulated to precise dimensions (e.g., as in step **645**).

Step **651** of sequence **650** may include partially populating a card with one or more components (e.g., an RFID device). Alignment cues may, for example, be communicated by the device (e.g., as in step **652**) to populate the remaining components at particular locations on a card (e.g., as in step **653**). An alignment cue may, for example, be the location of a device, such that other devices on the card may be placed at a relative displacement from the location of the device. An alignment cue may, for example, be location information that may be communicated by the device (e.g., via an RF field of an RFID device) such that other devices on the card may be placed at locations defined by the communicated location information.

Persons skilled in the art will also appreciate that the present invention is not limited to only the embodiments described. Instead, the present invention more generally involves dynamic information and the exchange thereof. Persons skilled in the art will also appreciate that the apparatus of the present invention may be implemented in other ways than those described herein. All such modifications are within the scope of the present invention, which is limited only by the claims that follow.

What is claimed is:

1. A method, comprising:

populating a card with at least one alignment cue and a plurality of components to form a populated card, wherein one of said plurality of components includes a dynamic magnetic stripe communications device; laminating said populated card to form a laminated card; aligning a trimming device to said at least one alignment cue; and

trimming said laminated card with said aligned trimming device to position said dynamic magnetic stripe communications device within a distance from a side of said card,

wherein said laminating of said populated card includes laminating such that a portion of said trimmed card includes said at least one alignment cue.

2. The method of claim 1, wherein said at least one alignment cue is at least one material.

3. The method of claim 1, wherein said at least one alignment cue is at least one magnetic material.

4. The method of claim 1, wherein said at least one alignment cue is at least one hard magnet.

5. The method of claim 1, wherein said aligning a trimming device includes aligning said trimming device to a magnetic field.

6. The method of claim 1, wherein said at least one alignment cue is at least one notch.

7. The method of claim 1, wherein said at least one alignment cue includes at least one notch,

said trimming device includes at least one protrusion, and said aligning a trimming device includes engaging said at least one notch with said at least one protrusion.

8. The method of claim 1, wherein said at least one alignment cue is at least one datum.

9. The method of claim 1, wherein said at least one alignment cue is an optical alignment cue.

10. The method of claim 1, wherein said at least one alignment cue is a non-optical alignment cue.

11. The method of claim 1, wherein said at least one alignment cue is at least one indicia.

12. The method of claim 1, wherein said at least one alignment cue is at least one tick mark.

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13. The method of claim 1, wherein said at least one alignment cue is at least one alignment target.

14. The method of claim 1, wherein said aligning a trimming device includes training said trimming device onto said at least one alignment cue.

15. The method of claim 1, wherein said at least one alignment cue is a mechanical alignment cue.

16. The method of claim 1, wherein at least one of said plurality of components is a flexible printed circuit board, and

said populating a card with at least one alignment cue includes printing indicia onto said flexible circuit board.

17. The method of claim 1, wherein at least one of said plurality of components is a display.

18. The method of claim 1, wherein said plurality of components includes at least a board, a processor, a battery, a display, and a button.

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19. A method, comprising:
populating a card assembly with a plurality of components and at least one alignment cue to form a populated card assembly, wherein one of said plurality of components includes a dynamic magnetic stripe communications device;
laminating said populated card assembly with a laminate layer including at least one laminate material;
aligning a trimming device to said at least one alignment cue; and
trimming said laminate layer with said aligned trimming device to form a trimmed laminate layer,
wherein said dynamic magnetic stripe communications device is positioned at a target distance from a side of said trimmed laminate layer, and
said laminating of said populated card assembly includes laminating such that a portion of said populated card assembly includes said at least one alignment cue.

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